

Section 12 Construction Area Traffic Control Devices**Section 12
Construction Area
Traffic Control
Devices****4-1201 General****4-1201
General**

This section provides guidelines for inspecting traffic control devices in construction areas. Section 2-2, “Traffic,” of the *Construction Manual* (manual) provides guidelines and a general overview about providing a safe and convenient passage of public traffic through the construction area. Section 2-2 and this section complement each other. Engineers who administer the provisions in Section 12, “Construction Area Traffic Control Devices,” of the *Standard Specifications*, must be familiar with both Section 2-2 and this section of the manual.

Engineers administering traffic control must also be familiar with the current *Manual of Traffic Controls for Construction and Maintenance Work Zones (Manual of Traffic Controls)*. If a discrepancy occurs between the contract plans and specifications and the *Manual of Traffic Controls*, the plans and specifications govern.

4-1202 Before Work Begins**4-1202
Before Work Begins**

Take the following general steps before work begins:

- To obtain a thorough understanding of the project’s traffic control needs and requirements, review the plans, special provisions, *Standard Specifications*, and *Standard Plans*.
- Determine what signs must be placed before work begins for the entire project and before work begins for each stage of the project.
- Determine the methods and equipment the contractor will use for closing lanes, ramps, and roadways, and for flagging and controlling one-way traffic.
- Note the various traffic control devices specified to be used. Some of these devices will require certificates of compliance. Signage and delineation materials listed in the special provisions must be listed in the Caltrans list of approved traffic products and must be covered by certificates of compliance. The resident engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.
- Visually inspect all traffic control devices to ensure conformity with the specifications. If you approve the devices for use, record the approval in the daily reports.

4-1202A Flagging

Discuss any flagging operation with the contractor before the operation begins. Ensure flaggers are trained in accordance with the *Manual of Traffic Controls* and the *Construction Safety Orders*. Review with the contractor how flaggers will communicate with each other, with pilot cars, and with workers inside the controlled area. Develop a plan for handling emergencies and emergency vehicles in the control zone.

4-1202B Barricades

Verify barricade construction complies with Section 12-3.02, “Barricades,” of the *Standard Specifications* and with Sheet A-73C of the *Standard Plans*. Reflective sheeting requires a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202C Flashing Arrow Signs

Verify Type I and Type II flashing arrow signs comply with Section 12-3.03, “Flashing Arrow Signs,” of the *Standard Specifications*.

4-1202D Portable Delineators

Before initial placement, verify that the type the contractor proposes conforms to requirements in Section 12-3.04, “Portable Delineators,” of the *Standard Specifications*. Portable delineators require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202E Portable Flashing Beacons

Verify portable flashing beacons conform to requirements in Section 12-3.05, “Portable Flashing Beacons,” of the *Standard Specifications*.

4-1202F Construction Area Signs

At the preconstruction conference, remind the contractor of the following:

- The contractor must maintain an inventory of commonly required items at the job site and arrange for sign panels, posts, and mounting hardware or portable sign mounts to be furnished on short notice.
- The special provisions list requirements for signage materials. Substrate and reflective sheeting for construction area signs require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.
- Before digging to install signposts, regional notification centers must be notified. Hand digging is required unless the location is free of underground utilities.

4-1202G Channelizers

For requirements for channelizers, review the plans, special provisions, and Section 12-3.07, “Channelizers,” of the *Standard Specifications*. Channelizers require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202H Temporary Railing (Type K)

Determine if temporary railing (Type K) is to be cast on the project. For temporary railing (Type K) cast off the project, a Certificate of Compliance is required.

Determine if temporary railing (Type K) is to be placed within 3 m of a traffic lane. The contractor must provide reflectors and adhesive, as noted in Section 12-3.08, “Temporary Railing (Type K),” of the *Standard Specifications*.

Freshly painted temporary railing (Type K) is required only before its first use on the project unless the special provisions require otherwise.

Reflectors for temporary railing (Type K) require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202I Traffic Cones

Verify traffic cones comply with Section 12-3.10, “Traffic Cones,” of the *Standard Specifications*. If the contractor plans to use cones for night work, determine the type of cone proposed. Removable reflective sleeves must be removed during daylight. Allow use of only one type of retroreflective cone. Reflective sleeves require a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202J Portable Changeable Message Signs

Before the first deployment of portable changeable message signs, arrange with the contractor to have them inspected. Perform field tests to verify compliance with Section 12-3.12, “Portable Changeable Message Signs,” of the *Standard Specifications*. Conduct these inspections and tests in conditions similar to those in which they will be used on the project, specifically, during the night or during the day.

Verify that the trailer can be leveled and that the sign operates within the required minimum and maximum heights.

4-1202K Temporary Crash Cushion Module

Review the project plans and sheets T1A, T1B, and T2 of the *Standard Plans*. Frequently the plans for stage construction, detour or traffic handling will require arrays of temporary crash cushion modules. Changes to any of these plans may alter the need for temporary crash cushion modules.

If installing temporary railing (Type K) creates a blunt-end exposure within 4.6 m of the edge of the traveled way, temporary crash cushions are required at that location.

The *Standard Plans* require that temporary crash cushions be installed on wooden pallets. The maximum acceptable pallet height is 115 mm. Pallets that exceed this height raise the sand in the crash cushions above an acceptable level. Do not use typical commercial pallets that exceed the allowed height.

Visually inspect crash cushion modules to ensure they conform to the requirements in the special provisions.

4-1202L Temporary Traffic Screen

For requirements for temporary traffic screen, review the special provisions and Sheet T4 of the *Standard Plans*.

4-1202M Temporary Signal System

As early as possible, verify that all state-furnished equipment is available at the location specified in the special provisions. If the equipment is not available, make other arrangements as soon as possible.

Verify that the actual visibility in the field meets the expected visibility. If sight distance is not adequate, contact the district traffic engineer for suggestions or recommendations.

Remote area signal installations are often located in forests or grasslands. Ensure all fire safety requirements are in place and operative before using the system. Checking fire safety requirements will often involve working with personnel from the local U.S. Forest Service, Bureau of Land Management, or California Department of Forestry.

4-1202N Traffic Plastic Drums

Before initial placement, verify the type that the contractor proposes complies with specified requirements. Reflective sheeting used on traffic plastic drums requires a Certificate of Compliance and a listing in the Caltrans list of approved traffic products. The engineer may accept another product as long as the district traffic engineer has approved it through written confirmation.

4-1202O Traffic Control System

- Before work begins, carefully review the plans, specifications, and sheets T10 through T17 of the *Standard Plans*. It is important to know in advance what personnel, signage, and equipment will be required to implement the traffic control system. Before using any traffic control system, ensure that all the components are on hand and have met all specified requirements.

Refer to “Cooperation” , if applicable, in the special provisions. Frequently a project is one of many in the same vicinity or in the same transportation corridor. In such instances, require that the various contractors coordinate their efforts by submitting in advance their schedules for lane closures and resolving schedule conflicts before any closures are implemented. Review these requirements with the contractors before work starts. Remove or cover any construction area signs that duplicate or contradict the signs for a project within 800 m of another project.

- In the contractor’s or subcontractor’s yard, if possible before the first use, inspect the signs and equipment the contractor proposes to use. Verify that all the necessary signs, cones, drums, and other equipment are on hand before setting up the system for the first time. If the proposed materials have already been used, check them for acceptability. Replace any unacceptable equipment. It is much easier to correct deficiencies before the system is installed.
- If the contractor is to place the traffic control system repeatedly in the same place, mark on the shoulder or pavement the locations of advance signs, cones, and drums. This will speed the placing of lane closures and ensure better taper alignment.

4-1203 During the Course of Work

4-1203 During the Course of Work

Contractors should maintain all traffic control devices in good working order throughout the project’s life. During operations requiring traffic control systems, engineers should ensure that all traffic control devices are correctly located and functioning properly.

4-1203A Flagging

Observe the flagging operation to ensure that the flaggers are using correct procedures for directing motorists. Also, ensure that flagging stations are laid out correctly, are visible to approaching traffic, and have correct advance warning signs. The contractor’s flaggers must be properly trained and equipped and must perform their duties in accordance with the *Manual of Traffic Controls*. When pilot vehicles are used, radios are required.



4-1203B Barricades

Ensure the contractor maintains barricades in a good state of repair and keeps the reflective surfaces clean. If weighting is necessary, use only bags of dry sand, and place all weights on the feet or lower parts of the frame or stays. Placing objects any higher, or using hard objects such as concrete or rocks for weights, may lead to injury or property damage should a vehicle hit the barricades.

4-1203C Flashing Arrow Signs

See that the proper types of flashing arrow signs are used as shown in the plans or as described in the special provisions.

Observe the equipment in operation and do the following:

- Ensure the lights are dimmed at night and set on bright during daylight hours.
- Verify the lights are not glaring into approaching traffic, especially truck traffic.
- Ensure compliance with at least the minimum visibility distances.
- Ensure the signs are properly aimed at approaching traffic. Pay special attention to the aiming of the sign whenever solar-powered signs are used. The special bulbs used with solar signs have much narrower beams than do conventional bulbs and, therefore, require greater care while being aimed.

4-1203D Portable Delineators

Require the contractor to immediately replace or restore portable delineators to their original location in an upright position when displaced or knocked down. Ensure the use of only one type of portable delineator on the project.

4-1203E Portable Flashing Beacons

Verify the proper operation and location of these beacons.

4-1203F Construction Area Signs

Ensure that the contractor promptly installs, relocates, covers, and removes signs as the contract requires. Construction signs should be covered or removed whenever they no longer serve a purpose. Verify that covers placed on sign panels completely block out any messages so that the messages cannot be seen day or night. The covers should also present a workmanlike appearance.

When it is necessary to weight sign standards to prevent the wind from overturning them, sandbags may be used. Do not permit rocks, broken concrete, or other hard objects to be used for this purpose.

Review construction area signs often during the course of the work. Require that signs be maintained as provided for in the contract. Signs should be clean, clearly visible, and repaired immediately if damaged.

4-1203G Channelizers

Check the contractor's layout work. Determine that the pavement is clean and dry and that the contractor places the channelizers in conditions that meet the required temperatures. If channelizers are displaced or fail to remain in an upright position, they are to be replaced at the contractor's expense.

4-1203H Temporary Railing (Type K)

Verify all new and used rail elements comply with requirements for end connection and surface finish. Order repainting when needed.

4-1203I Traffic Cones

Prohibit the use of traffic cones that have been damaged or coated with asphalt or other substances to the extent the cones have lost their ability to function as intended.

4-1203J Portable Changeable Message Signs

Make a drive-through inspection while the signs are in operation. A portable changeable message sign (PCMS) needs to be located where it provides the approaching motorist with at least the minimum visibility and legibility distances required by specification.

PCMSs are to display only preapproved messages. The resident engineer must ensure that the messages conform to district and Caltrans policy. Prohibit messages that do not convey real-time information to the motorist. Examples of unacceptable messages include ones such as “Drive carefully,” “Have a Nice Day,” and “Thank you.”

PCMSs, like any other pieces of equipment, are subject to the “Public Safety” clauses of the contract. When they actively display a message, PCMSs are working equipment. At all other times, they are parked or nonworking. The specifications typically will require that operating signs placed within 1.8 m of traffic be protected with a standard shoulder closure. Protect or remove nonoperating signs within 4 m of traffic to comply with the requirements of the “Public Safety” clause (for parked equipment) in the special provisions. In many cases, placing a PCMS behind existing guard railing will protect it. In cases when it is not practicable to remove nonoperating PCMSs, consult the district traffic engineer. The district traffic engineer may permit the PCMSs to be protected with an array of crash cushions in lieu of the temporary railing (Type K) required by the “Public Safety” specification.

Unless the contract states otherwise, contractors are not required to have PCMSs available at all times for the discretionary use of the resident engineer.

The contractor is also not obliged to have a PCMS available during periods when the traffic control system is nonoperational.

A PCMS for information and guidance to motorists is required only during times, places, or activities stated in the plans and specifications.

4-1203K Temporary Crash Cushion Module

Check that crash cushion module arrays are installed according to the manufacturer’s instructions. Verify that all crash cushion modules are filled with the proper weight of sand. Check pallet heights. Also, ensure that when arrays are placed, a minimum clearance of 2.4 m exists between the array and the nearest traffic lane. Contact the district traffic engineer for recommendations if you cannot obtain proper clearance to the traffic lane.

Be sure that the contractor installs “P” or “R” markers when required.

4-1203L Temporary Traffic Screen

Immediately after installation, review the screen placement, especially near entrance and exit ramps. If the screen blocks motorist visibility, order the screen’s removal and consult with the district traffic engineer concerning possible alternatives.

The supporting steel pipes should be placed on the traffic side of the screen. Then, if a panel becomes dislodged, the plywood will fall away from traffic.

4-1203M Temporary Signal System

Periodically review the temporary signal system to document its maintenance. Record inspection dates and conditions observed in the project records to protect both the state and the contractor.

If a system shutdown occurs, planned or unplanned, the contractor must immediately provide flaggers to control traffic until the traffic signals are functioning correctly.

4-1203N Traffic Plastic Drums

Check the contractor's layout work. Require the proper maintenance of traffic plastic drums. Require that water or sand ballast for the drums is placed in the base only. Sandbags are not allowed for ballast.

4-1203O Traffic Control System

Many projects will require the contractor to submit a request for a lane closure in advance of the intended date. This advance notification affords Caltrans the opportunity to coordinate work within the highway corridor. Review the contractor's requests both to avoid oversights and also to identify and reduce the number of unnecessary requests.

If the contractor fails to comply with the special provisions' clause titled "Closure Requirements and Conditions," by not opening the highway promptly, the contractor must submit a written work plan demonstrating that the highway will be opened in a timely manner in the future. Do not permit any lane closures until the contractor submits this plan and it is approved in accordance with district policy.

4-1203O (1) Field Adjustments

Field adjustments to the traffic handling plans are frequent occurrences. Adjustments must be made to ensure adequate sight distance, to avoid locations with multiple decisions, to accommodate expected queues, and to coordinate activities at multiple locations. The following are typical situations where field adjustments are necessary:

- Vertical and horizontal curves – Ensure tapers are visible for their entire length to approaching traffic. Do not hide the taper of a traffic control system behind a vertical or horizontal curve. Extend the tangent portion of the closure to better position the taper. (Under ideal conditions, all advance warning signs and the taper would be located in a tangent with the taper placed on a slight upgrade for improved visibility.)
- Ramps and connectors – Managing ramps and connectors within a lane closure presents several problems. Extend exit ramp tapers back through the lane closure as an extension of the ramp's shoulder line. Avoid sharply angled tapers. Extend entrance ramps through the closed lane by projecting the left shoulder line.
- Traffic queues – Contain traffic queues completely within the advanced warning signs of any closure. Containment may require modestly increasing the spacing between signs or require the placing of additional signs. Some districts have adopted a practice of providing motorists additional advanced warning by displaying information a mile or more in advance of the closure using portable or fixed changeable message signs. In metropolitan areas, this type of advance warning may be feasible through the cooperation of the transportation management center.
- Multiple closures and inter-project coordination – Avoid multiple closures with overlapping sign patterns. Connect closures by extending the tangents.
- Length of Closure — Avoid long closures with no evidence of activity. Consider placing supplemental tapers within an existing closure. When the work has safely progressed beyond the supplemental taper, remove the upstream taper and tangent. Ensure advanced warning signs for the new taper are located correctly.

If long closures are unavoidable, protect the active work area by placing barricades or drums across the closed lanes, upstream of the work area. Also, when possible, use barrier vehicles between the approaching motorist and workers on foot.

4-1203O (2) *Placement Sequence and the Start of Work*

Completely install the traffic control system before commencing work. The following gives you some installation instructions depending on the situation in which the system will be used:

- Systems affecting traffic only in one direction – Start with the first device that the drivers will see as they enter the work zone. (Usually a C18 “Road Construction Ahead” or C23 “Road Work Ahead” sign.) Additional devices are placed in sequence, moving in the direction of the traffic flow. Move the workers and equipment onto the closed lanes only after all system components are in place.
- Systems affecting traffic in both directions – Install the first sign drivers will see traveling in the opposing direction. Then install in sequence all remaining signs and devices in the opposing direction of travel. Next install the first sign drivers will see in approaching the work area from the affected direction. Place all remaining signs and devices in sequence through the work area. If flaggers are to be used, have flaggers take their stations; then move workers and equipment onto the road.
- Removal of the traffic control system – Remove all workers and equipment from the roadway. Then remove the devices and signs in the reverse order of placement. Restore all signs and signals to normal operation.

4-1203O (3) *Drive—Through Inspection*

Immediately after installation, make a drive-through inspection of the system. During the inspection, drive the system as though you had no knowledge of the work zone. Ensure the intended vehicle path is clearly visible. Remember that the motorist has no knowledge of the traffic control plan and is entirely dependent on the system for warning and guidance. Document this inspection in the daily report.

4-1203O (4) *Maintenance*

Ensure a contractor’s employee is assigned to maintain all night closures and any daytime closures over 1.6 km in length. Maintaining such closures is a full-time assignment, and the assigned worker should have no other duty. Ideally, the assistant resident engineer should be able to communicate directly with the contractor’s maintenance person by radio or cellular phone. The maintenance person should have spare cones, signs, and barricades available to replace or restore, system elements displaced or destroyed by traffic.

4-1203O (5) *Reverse Operations Inside Closures*

Workers can operate vehicles opposite the flow of traffic inside a closed lane. However, the workers should do so in a way that does not confuse approaching drivers or upset approaching traffic. The following practices are recommended if opposing operations are undertaken:

- During daylight operations, the vehicles facing oncoming traffic should have their headlights and their flashing amber lights turned on at all times.
- During night operations, the vehicles should have their headlights turned off and their hazard lights and flashing amber lights turned on.
- When removing a lane closure while facing traffic, the traffic control truck must turn around and back up through the taper area.

- At no time should a U-turn be permitted in traffic, and no vehicle should face towards traffic except when completely within a closed lane.

4-1204 Measurement and Payment

The following are directions for measuring and paying for various traffic control devices for construction areas:

4-1204 Measurement and Payment

4-1204A Flagging

Section 12-2.02, “Flagging Costs,” of the *Standard Specifications* requires that the cost of providing flaggers be divided equally between the state and the contractor. Determine the total cost using the force account method. The contractor is to be paid one-half of the computed total amount.

The division of costs applies to all flagging required to perform the planned work except in special situations cited in the special provisions. The state’s share of flagging costs are to be paid only when public traffic is involved.

The cost of providing flaggers includes the cost of transporting personnel between a central point and the location of the work, or from one location to another as necessary. The cost for flaggers also includes the costs of any stands or towers required for the flaggers to do their jobs properly. The cost does not include the costs of placing, maintaining, and removing construction area signs during flagging operations.

The flagging costs incurred in connection with increased or decreased work paid for at contract prices will be subject to the fifty-fifty split. It is assumed that the contractor’s share of such costs is included in the contract item price.

When work is added and paid for as extra work, the contractor should be compensated 100 percent for flagging costs associated with the extra work.

If changes are made at the request of, and for the benefit of the contractor, the contractor must pay for the additional flagging costs unless there are also particular benefits to the state that would warrant a sharing of the costs.

Include 50 percent of flagging costs in costs calculated according to Section 4-1.03C, “Changes in Character of Work,” of the *Standard Specifications*. Also, include the contractor’s 50 percent share of flagging costs in cost calculations for computing adjustments for increased or decreased item quantities.

4-1204B Barricades

Initial placement of each barricade (as shown on the plans or as directed by the resident engineer) is paid for as a contract item at the time of placement. Subsequent relocations of each barricade are paid for as extra work using the force account method. Damaged barricades must be repaired at the contractor’s expense, regardless of the cause, including damage by public traffic.

4-1204C Flashing Arrow Signs

Flashing arrow signs are paid for as part of the contract item for traffic control system.

4-1204D Portable Delineators

Portable delineators are paid for as part of the contract item for traffic control system.

4-1204E Portable Flashing Beacons

Portable flashing beacons are measured and paid for at contract item price by the unit except when they are part of a traffic control system. In that case, portable flashing beacons are paid for as part of the contract item for the traffic control system.

4-1204F Construction Area Signs

Construction area signs, except those used in traffic control systems for lane closures, are paid for as a lump sum item. The cost of the contractor's inventory of replacement sign materials is included in the contract price for construction area signs. Additional signs ordered by the resident engineer are paid for as extra work.

The cost of covering, uncovering, and removing signs (when they are no longer needed) is included in the contract price for construction area signs.

When determining how much to include on a progress pay estimate, withhold some payment sufficient to cover the cost of maintaining and removing the signs.

4-1204G Channelizers

Channelizers are paid for by the unit. The contract item price includes the costs of maintaining, replacing, and repairing channelizers. The contract item price also includes the costs of work necessary to restore channelizers damaged by public traffic.

4-1204H Temporary Railing (Type K)

Review the "Public Safety" section in the special provisions. Do not use the contract item for temporary railing (Type K) to pay for temporary railing that is placed to fulfill the requirements the "Public Safety" section.

Withhold some payment from progress pay estimates to cover the cost of removing temporary railing (Type K).

4-1204I Traffic Cones

Traffic cones are paid for as part of the contract item for a traffic control system.

4-1204J Portable Changeable Message Signs

A portable changeable message sign (PCMS), commonly bid as "Furnish - Each" or "Furnish - Lump Sum," requires the contractor to place, operate, maintain, and remove the sign as directed by the resident engineer.

The resident engineer, with a minimum notice of one full working day, may direct the contractor to provide PCMSs for use not otherwise provided for in the contract. Payment due the contractor is to be computed as extra work.

4-1204K Temporary Crash Cushion Modules

Review the "Public Safety" section of the special provisions. Do not use the contract item for temporary crash cushion modules to pay for temporary crash cushion modules that are placed to fulfill the requirements of the "Public Safety" section.

Withhold some payment from progress pay estimates to cover the cost of removing temporary crash cushion modules.

4-1204L Temporary Traffic Screen

Temporary traffic screen is measured and paid for according to the special provisions.

4-1204M Temporary Signal system

The lump sum payment for this item includes all the costs of hauling state-furnished materials between the designated pickup locations, the project, and the designated salvage location. If the pickup or salvage location is changed, then any additional costs or savings to the state should be recognized.

Flaggers are not a shared cost if the contractor provides them as a result of a shutdown of the signals for any reason. This provision is an exception to the general practice of sharing the cost of flaggers.

4-1204N Traffic Plastic Drums

Count the traffic plastic drums for payment as they are placed in the locations shown on the plans. Drums used instead of cones, barricades, or delineators as part of a traffic control system or used as specified under “Public Safety” of the special provisions are not to be paid for at contract item price.

4-1204O Traffic Control System

For all project work, the lump sum payment for traffic control system includes payment for all labor, equipment, and materials to install, maintain, and remove traffic control system as shown on the plans or *Standard Plans*. The contract item for the traffic control system includes payment for portable signs, cones, delineators, and flashing arrow signs as shown on the plans for the traffic control system.

Include compensation or credit in the change order when an ordered change in the work affects the contract item for the traffic control system.

Traffic control costs in support of extra work are to be paid as part of the extra work. Compute the payment as a force account or as an adjustment of compensation based on a force account analysis. The contract change order that authorizes the extra work must reflect these costs.

In addition to adjustments for ordered changes, the resident engineer may consider adjustments to the contract item for the traffic control system when the following circumstances exist and result in additional lane closures:

- A material change exists over or under the engineer’s estimated quantity that is not caused by an ordered change for a contract item or items.
- Insufficient information exists in the contract for the contractor to verify the engineer’s estimated quantity for the contract item or items. The contractor relied on the engineer’s estimated quantity or quantities to determine the number of lane closures required.
- The additional lane closures are solely for work on the contract item or items meeting the criteria for the above.

Calculate adjustments for the circumstances listed above on a force account basis.